

What is claimed is:

1. A method for producing gas turbine fuel oil from feed oil with increased yields, comprising:

an atmospheric distillation step of subjecting crude oil acting as said feed oil to atmospheric distillation to separate said crude oil into light oil and atmospheric residue oil;

a first hydrotreating step of contacting the light oil produced in said atmospheric distillation step with pressurized hydrogen in the presence of a catalyst in a lump, to thereby carry out an impurity removal treatment, resulting in obtaining refined oil;

a first separation step of separating said atmospheric residue oil into a light oil matter and a heavy oil matter;

said first separation step being selected from the group consisting of vacuum distillation, solvent deasphalting, thermal cracking and steam distillation; and

a second hydrotreating step of contacting the light oil matter produced in said first separation step with pressurized hydrogen in the presence of a catalyst, to thereby carry out an impurity removal treatment, resulting in obtaining refined oil;

gas turbine fuel oil obtained in said first and second hydrotreating steps being 4 cSt or less in viscosity at 100°C, containing alkaline metal in an amount of 1 ppm or less, lead in an amount of 1 ppm or less, V in an amount of 0.5 ppm or less, Ca in an amount of 2 ppm or less and sulfur in an amount of 500 ppm or less, and being produced with yields of 65% or more based on said feed oil.

2. A method as defined in claim 1, wherein said first hydrotreating step and second hydrotreating step are executed as a common step.

3. A method as defined in claim 1, further comprising a second separation step of separating said heavy oil matter produced in said first separation step into a light oil matter and a heavy oil matter;

said second separation step being selected from the group

consisting of solvent deasphalting and thermal cracking; and
a third hydrotreating step of refining said light oil matter produced in said second separation step, to thereby obtain refined oil, which is used as the gas turbine fuel oil.

4. A method as defined in claim 3, wherein at least two of said first, second and third hydrotreating steps are executed as a common step.

5. A method as defined in claim 1 or 2, further comprising a fourth hydrotreating step of contacting the heavy oil matter produced in said first separation step with pressurized hydrogen in the presence of a catalyst, to thereby carry out an impurity removal treatment and cracking a part of said heavy oil matter, resulting in obtaining refined oil and a heavy oil matter;

said refined oil produced in said fourth hydrotreating step being used as the gas turbine fuel oil.

6. A method for producing gas turbine fuel oil from feed oil with increased yields, comprising:

an atmospheric distillation step of subjecting crude oil acting as said feed oil to atmospheric distillation to separate said crude oil into light oil and atmospheric residue oil;

a first hydrotreating step of contacting the light oil produced in said atmospheric distillation step with pressurized hydrogen in the presence of a catalyst in a lump, to thereby carry out an impurity removal treatment, resulting in obtaining refined oil;

a fifth hydrotreating step of contacting said atmospheric residue oil with pressurized hydrogen in the presence of a catalyst, to thereby carry out an impurity removal treatment and cracking a part of a heavy oil matter, resulting in obtaining refined oil and a heavy oil matter;

gas turbine fuel oil obtained in said first and fifth hydrotreating steps being 4 cSt or less in viscosity at 100°C, containing alkaline metal in an amount of 1 ppm or less, lead in an amount of 1 ppm or less, V in an amount of 0.5 ppm or less, Ca in an amount of 2 ppm or less and sulfur in an amount

of 500 ppm or less, and being produced with yields of 65% or more based on said feed oil.

7. A method as defined in claim 6, further comprising a third separation step of separating said heavy oil matter produced in said fifth separation step into a light oil matter and a heavy oil matter;

said third separation step being selected from the group consisting of vacuum distillation, solvent deasphalting and thermal cracking;

said light oil matter produced in said third separation step being used as the gas turbine oil.

8. A method as defined in any one of claims 1 to 7, wherein the gas turbine fuel oil is further subject to atmospheric distillation, to thereby provide light gas turbine fuel oil and heavy gas turbine fuel oil heavier than the light gas turbine fuel oil.

9. A method as defined in any one of claims 1 to 4 and 7, wherein the heavy oil matter produced in the last separation step is used as fuel oil for a boiler.

10. A method as defined in claim 5, wherein said heavy oil matter produced in said fourth hydrotreating step is used as fuel oil for a boiler.

11. A method as defined in any one of claims 1 to 10, wherein said feed oil is subject to a desalting treatment prior to said atmospheric distillation step.

12. A method as defined in any one of claims 1 to 10, wherein said heavy oil matter produced on the basis of said feed oil is partially oxidized by oxygen to produce hydrogen, which is used in said hydrotreating steps.

13. A method for producing gas turbine fuel oil from feed oil with increased yields, comprising:

a first separation step of separating heavy feed oil consisting of atmospheric residue oil obtained by atmospheric distillation of crude oil and/or heavy oil into a light oil matter and a heavy oil matter;

said first separation step being selected from the group

consisting of vacuum distillation, solvent deasphalting, thermal cracking and steam distillation; and

a second hydrotreating step of contacting said light oil matter produced in said first separation step with pressurized hydrogen in the presence of a catalyst, to thereby carry out an impurity removal treatment, resulting in obtaining refined oil;

gas turbine fuel oil which is refined oil thus obtained being 4 cSt or less in viscosity at 100°C, containing alkaline metal in an amount of 1 ppm or less, lead in an amount of 1 ppm or less, V in an amount of 0.5 ppm or less, Ca in an amount of 2 ppm or less and sulfur in an amount of 500 ppm or less, and being produced with yields of 40% or more based on said heavy feed oil.

14. A method as defined in claim 13, further comprising a second separation step of separating said heavy oil matter produced in said first separation step into a light oil matter and a heavy oil matter;

said second separation step being selected from the group consisting of solvent deasphalting and thermal cracking; and

a third hydrotreating step of refining said light oil matter produced in said second separation step, to thereby obtain refined oil, which is used as the gas turbine fuel oil.

15. A method as defined in claim 13, further comprising a fourth hydrotreating step of contacting said heavy oil matter produced in said first separation step with pressurized hydrogen in the presence of a catalyst, to thereby carry out an impurity removal treatment and cracking a part of said heavy oil matter, resulting in obtaining refined oil and a heavy oil matter;

said refined oil produced in said fourth hydrotreating step being used as the gas turbine fuel oil.

16. A method for producing gas turbine fuel oil from feed oil with increased yields, comprising:

a fifth hydrotreating step of contacting heavy feed oil consisting of atmospheric residue oil obtained by atmospheric

distillation of crude oil and/or heavy oil with pressurized hydrogen in the presence of a catalyst, to thereby carry out an impurity removal treatment and cracking a part of a heavy oil matter, resulting in obtaining refined oil and a heavy oil matter;

gas turbine fuel oil which is refined oil thus obtained in said fifth hydrotreating step being 4 cSt or less in viscosity at 100°C, containing alkaline metal in an amount of 1 ppm or less, lead in an amount of 1 ppm or less, V in an amount of 0.5 ppm or less, Ca in an amount of 2 ppm or less and sulfur in an amount of 500 ppm or less, and being produced with yields of 40% or more based on said heavy feed oil.

17. A method as defined in claim 16, further comprising a third separation step of separating said heavy oil matter produced in said fifth hydrotreating step into a light oil matter and a heavy oil matter;

said third separation step being selected from the group consisting of vacuum distillation, solvent deasphalting and thermal cracking;

said light oil matter produced in said third separation step being used as the turbine fuel oil.

18. ~~Gas turbine fuel oil produced according to a method as defined in any one of claims 1 to 17.~~

19. A power generation method comprising the steps of:
driving a gas turbine using gas turbine fuel oil defined in claim 18 as fuel therefor to carry out power generation;
and

using high-temperature exhaust gas discharged from said gas turbine as a heat source for a waste heat recovery boiler and driving a steam turbine by means of steam generated in said waste heat recovery boiler, resulting in power generation being carried out.